

i.e.

Department of Industrial Engineering

New Dean Sees a Promising Future for IE



The College of Engineering and Sciences has new leadership. Dr. Esin Gulari, who has just completed her first year at Clemson, came to us from the Department of Chemical Engineering and Materials Science at Wayne State University. A graduate of Cal Tech, Dr. Gulari also served at the National Science Foundation as both the Director of the Chemical and Transport Systems Division and as the Assistant Director for the Engineering Directorate.

One of her major goals is to achieve national and international recognition for the College by improving the quality of its programs and offerings. To that end, she has unveiled a series of initiatives, one that places IE in the forefront. "The IE program is showing significant changes through new faculty hires, program development, endowed professorships and student scholarships. All of these contribute to our plan to move Industrial Engineering into the upper echelon of IE programs." As a result, Dr. Gulari sees the Industrial Engineering program as a "critical component in the College's overall plan for seeking national and international recognition."

The New Faces of IE



New IE faculty (from left to right) Dr. Mary Beth Kurz, Dr. Maria Mayorga, Dr. Kevin Taaffe and Dr. Sandra Garrett.

What do long queues at baseball concession stands, virtual reality systems for asynchronous learning, rail car routing, hexadactyly (a birth disorder which results in a 6th digit), golf ball production and a pandemic flu outbreak, all have in common? These are only a sample of the wide range of topics the new faculty in Clemson's Industrial Engineering Department are working on.

The faculty in the department has recently received a facelift, with several new hires in recent years. These new members to the IE team represent the top picks in their class and all come from top 20 institutions, including The University of Florida, Purdue University, The University of Arizona, and The University of California – Berkeley.

As a discipline, we are well established in production and service systems, logistics, education and learning systems, and human factors. However, this elite group of researchers and academicians are working to address the ever expanding field of IE by tackling new and current issues now facing our discipline. Dr. Mary Beth Kurz focuses on modeling service and transportation systems for scheduling purposes and on developing heuristics and meta-heuristics to find solutions for scheduling problems. Dr. Kevin Taaffe looks at production and inventory management, transportation and logistics system analysis, optimization, and simulation modeling. Dr. Maria Mayorga researches marketing and operations interfaces and the application of stochastic optimization in production and service systems; and our latest addition, Dr. Sandra Garrett, takes a holistic, cross-disciplinary approach to human factors research, exploring theoretical issues in information flow and knowledge development within complex environments such as healthcare.

This new generation of researchers and instructors are working to help bring the department to new levels of national recognition by pursuing cutting edge research that will yield significant solutions and improving the way we will interact and use today's complex systems.

Message from the Department Chair



This issue highlights the changing face of our Department. Over the last four years, we have recruited new faculty from top Industrial Engineering programs, the latest being Dr. Sandra Garrett from Purdue. With a strong background in health systems and human factors, she is ideally positioned to pursue interdisciplinary research with our colleagues in the bioengineering and medical fields. In addition, we will soon announce an endowed chair search in Supply Chain, Optimization and Logistics. Made possible through a \$4 million endowment, this will be one of the most significant positions in this area in the country. More details regarding this announcement will be available on our web site in the fall.

Over the last few years, we have also seen a significant growth in research funding. The Industrial Engineering Department has been selected as an NSF site for the Center for Engineering Logistics and Distribution. As part of this Center, several faculty (Drs. Ferrell, Kurz, Shappell and Taaffe) are pursuing systems integration, logistics and optimization research with several regional and upstate companies. Most importantly, this research is receiving national recognition. An example is the work of Dr. Kurz, the first in our department to harness the new Condor grid at Clemson, using the equivalent of 17 years of computer time in just one week. According to Dr. Arden Bement, Director of the National Science Foundation, leadership in such areas of Cyberinfrastructure "may well become the major determinant in measuring pre-eminence in higher education among nations."

To conclude, I would like to congratulate Mrs. Cara Cornelius for winning the 2006 Clemson IE Alumni of the Year Award. In her short career, Cara has risen to the top, serving as the Director of Supply Chain and Logistics for TCI Tire Centers, a subsidiary of Michelin. She has been a true well wisher and an excellent ambassador of this program.

Finally, we thank our alumni and friends for your continued generous support. We truly appreciate your contributions to the Department. I encourage you to visit us at www.ces.clemson.edu/ie — and please do stop by if you happen to be in the area.

Anand K. Gramopadhye

IE Welcomes New Faculty, Dr. Sandra Garrett



Upon completing her B.S. (1999) in Industrial Engineering from Clemson University, Dr. Sandra Garrett went on to receive both her M.S.I.E. (2002) and PhD. (2007) in Industrial Engineering from Purdue University. In general, Dr. Garrett's research in human factors engineering has taken a holistic, cross-disciplinary approach, exploring theoretical issues in information flow and knowledge development within complex environments.

Dr. Garrett is currently working for Purdue University's Healthcare Technical Assistance Program.

She serves as the project manager for a contract with the Indiana State Department of Health studying the feasibility of alternative care site systems for a pandemic flu outbreak. She has been very active in the Human Factors and Ergonomics Society, and is currently serving as the webmaster for the Health Care Technical Group and as a Co-Chair for the Student Forum at this year's annual meeting.

Clemson IE Goes Online

The IE Department is excited to be offering several undergraduate and graduate courses online utilizing technologies including BlackBoard and Macromedia Breeze. We are offering the following courses online in Summer 2007 and will offer similar courses each summer for the foreseeable future:

IE 360 Industrial Applications of Probability and Statistics

IE 384 Engineering Economic Analysis

IE 456/656 Supply Chain Design and Control

IE 457/657 Transportation and Logistics Engineering

IE 462/662 Six Sigma Quality

IE 487/687 Industrial Safety

IE 488/688 Human Factors Engineering

In Summer 2007, over 120 students are registered for these courses. These online courses facilitate more scheduling flexibility for students, enabling graduate and undergraduate students to reduce their times to graduation or enabling them to take more courses during regular semesters. These courses also allow students to complete courses while off-campus, such as while participating in the Co-operative Education Program, in Study Abroad, or during summer ROTC training.



IE students Jessica Patterson (above) and Katie Berry (below) view course materials for their online class.

We are pleased to be able to offer these courses to students at other institutions as well. Please contact Clemson IE Student Services Coordinator, Mrs. Beverly Robinson, brobin4@clemson.edu, for information on enrollment procedures.



Institute of Industrial Engineers has Eventful Year at Clemson



This past year has been a very eventful one for the student chapter of IIE at Clemson University. IIE organized a number of events including the First Annual IIE Golf Tournament, a trip to the IIE Annual Regional Student Conference, and the Department of

Industrial Engineering Annual Awards Banquet, as well as BBQs, ice cream socials, and bowling!

This year the Regional Student Conference was held at Virginia Tech in Blacksburg, VA, on February 8-11. Our students had the opportunity to attend several job fairs, go on a tour of the UPS distribution center in Roanoke, VA, and hear several knowledgeable speakers discuss current industry issues.

The year was brought to a close in April at the Department's 2007 Annual Awards Banquet held at the Madren Conference Center.

This year's program concluded with a special award presented to Dr. William Ferrell in recognition of his dedication as the faculty advisor to IIE over the past 16 years. The Department would also like to welcome Dr. Kevin Taaffe as the new IIE faculty advisor.



Members from the Clemson IIE student chapter attended the Regional Student Conference at Virginia Tech in February.

Condor Use at Clemson

Dr. Mary Beth Kurz is on track this year to become a top-10 teragrid user in the United States. In less than 4 months, she amassed over 37 CPU-years of computing time using Condor. Dr. Kurz was the first to harness the new Condor grid at Clemson, using the equivalent of 17 years of computer time in just one week.



"Before using the campus grid, I was completely without hope of completing the computational studies my research required," Dr. Kurz said. "As soon as I saw hundreds of my jobs running on the campus grid, I started sending love notes to the Condor team at Clemson." Dr. Kurz studies genetic algorithms for large scale optimization, in applications such as single and multiple objective scheduling, multi-objective TSP, and logistic regression. Thanks to Condor, she is able to compare more alternative genetic algorithm designs in order to find the ones that can best be applied in a wide variety of problem settings.

Created at the University of Wisconsin-Madison, Condor is a distributed system that turns a collection of computers into a powerful campus grid. Clemson University has now deployed Condor, creating a computing grid with over 1,000 windows PC in labs, the libraries, and other places on campus.

Dr. Kurz's work has been highlighted by gridtoday.com, supercomputingonline.com, *Condor Week 2007*, and in an NSF nugget used to support the American Competitiveness Initiative. Her current research in rail scheduling is funded by IntelliTrans, and her current research in educational assessment is funded by NSF DUE-0703061.

2007 Industrial Engineering Awards

Outstanding Junior

Jaclyn D. Brenes
Danielle N. Lanigan

Jim Chisman Outstanding Senior

Michelle Hatcher
Laura R. Young

Senior Academic Achievement

Oliver Basic
Laura R. Young

Sophomore Academic Achievement

Jennifer M. Tate

Junior Academic Achievement

Anna B. Sparks



Lindenmeyer Leadership and Public Service Award

Laura R. Young

IIE Award of Excellence

Aubrey E. Nilsen

Kimbler Undergraduate Research Award

Lindsay Becker, Jaclyn Brenes, Michelle Hatcher



IE Students Learn New Skills Through Creative Inquiry Initiative



There's nothing worse than missing Daniel Moskos's first pitch of the game because you are waiting in line at the concession stand for your peanuts. That's exactly what a couple of innovative Industrial Engineering students

thought last semester before they decided to do something about it – operations research style. IE students Greg Gunn and Danielle Lanigan, lead by IE Professor Dr. Maria Mayorga, are using their knowledge about queuing theory to help minimize the long lines in Doug Kingsmore Stadium. After attending many baseball games, the team noticed the inconsistency of the line size at the concession stands. Further investigation determined that these variable queues were caused by “bursty” demand periods. Currently, the team is assessing this situation, gathering initial data to determine the interarrival and service time distributions.

This type of class project, where students learn about traditional theories through discovery-based application, is a result of a new university-wide initiative called Creative Inquiry (CI). CI expands the former Undergraduate Research Program to include projects involving design, service learning, and visual and performing arts. The purpose of this program is to provide meaningful experiences promoting skills in reasoning, critical thinking, ethical judgment, and communications. By providing these within specific disciplines, students also achieve some mastery of the research and/or problem-solving methods important to their academic fields. These experiences can then lead to capstone design projects and other possibilities important to the engineering education of all students, not just those interested in research.

The Department of Industrial Engineering has met this initiative with enthusiasm, becoming a model to the University for incorporating CI into the curriculum. It has

developed a departmental CI program requiring students to participate on a meaningful level, allowing them to match their projects with their interests. To that end, next fall there will be four active CI teams covering a wide range of subjects: Health Care Emergency Evacuation Planning, Applying Operations Research to Real-World Problems in the Service Industry, Project GADGET: Genetic Algorithms Designed by an Undergraduate Engineering Team, and Design Experiences in Human-Computer Interaction. These projects are led by Dr. Taaffe, Dr. Mayorga, Dr. Kurz, and Dr. Greenstein, respectively.



Creative Inquiry allows students to explore engineering in a whole new way through discovery-based learning and hands-on application.

Where are they now?

Highlighting Clemson IE Alumni Garvin Barker



Garvin Barker is a 1994 graduate of the Clemson IE Program. He is currently a Process Improvement Manager in the Advanced Manufacturing group at Square D Company. Garvin works with Square D's manufacturing facilities across North America to develop and implement strategies to improve assembly processes and establish a culture focused on continuous improvement. Garvin and his wife Lynn live in Walhalla, SC, with their children Madison and Matthew. The Barkers are avid Tiger football fans and enjoy spending their fall Saturdays at Death Valley.

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